Software Engineering Research Laboratory

Software Engineering

Group Project

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Traceability Matrix

A traceability matrix is a tool used in software development and testing to ensure that all requirements are covered by test cases and that all test cases are mapped back to the original requirements. It provides a clear view of the relationship between requirements, test cases, and defects, allowing for easy tracking and verification.
Here's a general template and steps you can follow to create a traceability matrix for the SERL lab :

1. Identify the requirements: Start by listing all the requirements of the SERL lab. These requirements can include functional requirements (what the system should do) and non-functional requirements (performance, security, etc.). Each requirement should be uniquely identified and described in detail.
2. Identify the test cases: Once you have the requirements, identify the corresponding test cases. Test cases should be designed to verify that each requirement is met. Each test case should have a unique identifier and a detailed description of the steps to be executed and the expected results.
3. Create the traceability matrix: Create a table with the following columns: Requirement ID, Requirement Description, Test Case ID, Test Case Description. The matrix will map each requirement to the corresponding test case(s).
4. Populate the matrix: Fill in the matrix by linking the requirements to the associated test cases. For each requirement, list the test case(s) that verify it. If multiple test cases verify a single requirement, list them all in separate rows.
5. Review and validate: Review the traceability matrix to ensure that all requirements are covered by at least one test case, and that all test cases are linked to the appropriate requirements. This step helps in identifying any gaps or missing test cases.
6. Update and maintain: As the project progresses and changes occur, update the traceability matrix to reflect any modifications to the requirements or test cases. Keeping the traceability matrix up to date ensures its accuracy throughout the development lifecycle.

It is purely based on the specific requirements provided. Specifically, a traceability matrix links requirements to other project artifacts, allowing stakeholders to easily track the progress of each requirement and ensure that they are adequately addressed. By mapping requirements to design elements, implementation code, test cases, and other project deliverables, the traceability matrix enables effective change management, impact analysis, and verification/validation activities.

When it comes to software development, a traceability matrix helps establish a clear connection between the requirements specified by stakeholders and the subsequent design, implementation, and testing activities carried out by the development team. This ensures that the end product meets the intended objectives and satisfies the specified requirements.

The traceability matrix typically includes rows representing the requirements and columns representing the project artifacts. Each cell in the matrix indicates the relationship between a specific requirement and a project artifact. The relationships can be denoted using different symbols or indicators, such as "X" for a direct mapping or "O" for an indirect mapping.

By having a traceability matrix in place, project teams can easily trace backward from a particular requirement to understand which design elements and implementation code fulfill that requirement. Conversely, they can trace forward from a design element to identify which requirements it addresses.

Overall, a traceability matrix serves as a valuable tool for ensuring the completeness, consistency, and traceability of project artifacts, enabling stakeholders to have visibility into the progress and alignment of requirements throughout the software development lifecycle.

Roughly, here are few specific Requirements for our projects SERL :
1) Admin, users and student can login.While doing login, they will be asked to login either as Admin, user or student

2) Admin can add student, add faculty , search student , search faculty , reports and log out

3) user can first register and then login and then even reset his password

4) user can create his profile as a faculty , phd.

5) Faculty and phd students can create his profile and and add his project in project page.

6) Admin can delete user , faculty, phd profile.

Here is the traceability matrix for the above specific requirements.

Requirement ID	Requirement Description	Test Case ID(s)	Test Case Description(s)
REQ001	User login functionality should be implemented.	TC001, TC002	Verify that a user can successfully log in with valid credentials. Verify that an error message is displayed when invalid credentials are entered.
REQ002	User registration functionality should be implemented.	TC003	Verify that a user can successfully register a new account with valid information.
REQ003	Password reset functionality should be implemented.	TC004	Verify that a user can reset their password using the provided password reset mechanism.
REQ004	Users should be able to create a profile with faculty or PhD designation.	TC005	Verify that a user can create a profile and select their designation as either faculty or PhD.
REQ005	Faculty and PhD users should be able to create their profiles and add projects to the project page.	TC006	Verify that a faculty or PhD user can create their profile and add projects to the project page with all the required details.

Requirement ID	Requirement Description	Test Case ID(s)	Test Case Description(s)
REQ006	Admin should have the ability to delete user profiles, faculty profiles, and PhD profiles.	TC007, TC008, TC009	Verify that the admin can delete a user profile. Verify that the admin can delete a faculty profile. Verify that the admin can delete a PhD profile.

Explaining each requirement ID :

1. **REQ001- User login functionality should be implemented**
   - Test Case Ids : TC001, TC002
   - Test Case Desscription(s) : Verify that a user can successfully log in with valid credentials. Verify that an error message is displayed when invalid credentials are entered
2. REQ002- **User registration functionality should be implemented**
   - .Test Case ID(s): TC003
   - Test Case Description(s): Verify that a user can successfully register a new account with valid information.
3. **REQ003 - Password reset functionality should be implemented.**

- Test Case ID(s): TC004
- Test Case Description(s): Verify that a user can reset their password using the provided password reset mechanism

4. **REQ004 - Users should be able to create a profile with faculty or PhD designation.**

- Test Case ID(s): TC005
- Test Case Description(s): Verify that a user can create a profile and select their designation as either faculty or PhD.

5. **REQ005 - Faculty and PhD users should be able to create their profiles and add projects to the project page.**

- Test Case ID(s): TC006
- Test Case Description(s): Verify that a faculty or PhD user can create their profile and add projects to the project page with all the required details.

6. **REQ006 - Admin should have the ability to delete user profiles, faculty profiles, and PhD profiles.**

- Test Case ID(s): TC007, TC008, TC009

- Test Case Description(s): Verify that the admin can delete a user profile. Verify that the admin can delete a faculty profile. Verify that the admin can delete a PhD profile.

In summary, the traceability matrix provides a mapping between each requirement and the corresponding test cases that are designed to verify them. Each requirement has a unique identifier (Requirement ID) and a description (Requirement Description). Similarly, each test case has a unique identifier (Test Case ID) and a description (Test Case Description).